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THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. November, 1909. No. 131.

A NEW VARIETY OF ABIES BALSAMEA.

M. L. Fernald.

Early in August, 1907, while botanizing in eastern Quebec, the writer became much interested in two varieties of the Balsam Fir, *Abies balsamea*, which differed so strikingly in their cones as to attract his instant attention. On the slopes of Mt. Ste. Anne and Percé Mt., near the tip of the Gaspé Peninsula, the two trees are both abundant and they were there first noticed in looking from a high level across the tops of the Firs. In attempting to distinguish in the landscape the spire-like tops of the White Spruce (*Picea canadensis*) the Black Spruce (*Picea mariana*), and the Fir (*Abies balsamea*), Professor J. F. Collins and the writer were puzzled by the unusual appearance of many of the trees. Though obviously Firs their summits at that season had a peculiar whitish misty appearance which distinguished them in the forest from the ordinary *Abies balsamea* as figured, for example, in Sargent's Silva (xii. t. 610). Upon felling one of the trees the source of the unusual whitish appearance (quite different from that produced by pitch) was revealed, for in all the cones the thin wide-spreading awns and sometimes the broad erose and emarginate tips of the bracts were still exserted beyond the thick dark scales. In the ordinary *A. balsamea* the pale membranous bracts, during the flowering season, are much longer than the firmer dark scales, but the latter quickly develop and by July much exceed their subtending bracts and those above. This was the condition in the trees upon Percé Mt. which we had picked out, without question, as the familiar *A. balsamea*. During the remaining two weeks of our stay at Percé the Firs were closely watched and it was found that the two trees were readily distinguished near at hand (and, by the aid of a glass, in the distance).

Many attempts to correlate slight differences of foliage with the peculiarity of the cones showed that both trees had the same trivial variations in the needles and that only in the comparative length of the scale and its subtending bract were the trees separable.

The cones secured at Percé were not mature and it was felt that, although the two trees were growing side by side and under conditions which indicated the same state of development, there still remained the slight possibility that, as the season advanced, the cone-scales would further elongate and obscure the difference which was so conspicuous in mid-summer. The material was consequently pigeonholed until further observations could be made. During the past summer, therefore, while spending some weeks with Professor K. M. Wiegand in eastern Washington County, Maine, the writer was pleased to find the same two variations of the Fir. There, however, the trees, though ordinarily distinct, showed more intergradation in the length of their bracts than was observed at Percé, indicating that they were to be considered varieties of one species rather than specifically distinct. Again the cones when observed were not fully mature, but this difficulty has been happily overcome, for through the kindness of Miss Mary Deane Dexter the writer has received the top of a fruiting tree collected at Winter Harbor, Hancock County, Maine, on September 25th. This material sent by Miss Dexter is fully mature and the cone-scales are rapidly falling. All but the uppermost scales are equalled or exceeded by the divergent awn of the subtending bract so that the awns appear wide-spreading and stand out 1 to 5 millimeters from the cone. This prominence of the awn is due not so much to the fact that it equals or exceeds the subtended scale as to the failure of the scale next below to cover it. Material from another station has also come to hand. This is a fruiting sprig with disintegrating cones sent from Monhegan Island on September 6, by Mrs. Edwin C. Jenney to Edward L. Rand, Esquire, as "a Fir which puzzles us because of the bristles on the cones." Mrs. Jenney writes further: "The tree had evidently been blown over some years back and was growing in a horizontal position. In spite of this fact it is a large and healthy-looking tree. We wondered very much about the cones, never having noticed any with the extended awns before."

In searching the literature of the subject the writer finds that *Abies balsamea* is sometimes described as having the bracts "shorter than the scales or rarely longer," but his own experience in the field and these

recent observations by others lead him to the conviction that the tree in which the awns of the bracts are so obvious in fully grown cones should be separated varietally from the ordinary form of the species. Comparison of the scales of disintegrated mature cones shows that in the typical *A. balsamea* the bract (including the erect awn) is ordinarily about two thirds as long as the lamina of its subtended scale, though varying from three sevenths to five sixths as long; while in the variety with divergent exserted awns the bract is ordinarily as long as, and occasionally a little longer than its subtended scale; and that in general the variety has slightly smaller cones than the typical form of the species.[1] On account of these characteristics of the cones the tree is here proposed as

ABIES BALSAMEA (L.) Mill., var. **phanerolepis**, n. var., strobilis subcylindraceis; laminis ovuliferis maturis suborbicularibus vel reniformibus 8–13 mm. longis; laminis membranaceis 8–13 mm. longis, cuspide patenti exserta.

Strobils subcylindric: mature laminas of the ovuliferous scales suborbicular or reniform, 8–13 mm. long; of the membranaceous bracts 8–13 mm. long, with a spreading exserted awn: otherwise as in the typical form of the species.— QUEBEC, slopes of Percé Mt., Percé, Gaspé County, August 3, 1907 (*Fernald & Collins*, no. 860): NEWFOUNDLAND, cool damp soil, Channel, July 27–August 1, 1901; damp woods, near Topsail, Conception Bay, August 12–19, 1901 (*Howe & Lang*, nos. 975, 1303): MAINE, Pembroke, July 23, 1909 (*Fernald*); Grindstone Neck, Winter Harbor, September 25, 1909 (*Miss Mary Deane Dexter*) Monhegan Island, September 6, 1909 (*Mrs. Edwin C. Jenney*).

This may well be the variation of *Abies balsamea* which has given rise to the report at various times of *A. Fraseri* from New England. In that southern species, however, the cones are more ovoid and the bracts are very much longer than the scales and have strongly recurved broad tips. In Loudon's Encyclopedia of Trees and Shrubs there is a fairly characteristic figure (fig. 1953) of the cone of var. *phanerolepis*, indicated as an illustration of *Picea balsamea*.

GRAY HERBARIUM.

[1] Measurements of mature scales of *A. balsamea*, taken at random from many cones, show the laminas of the scales to range from 11 to 15 mm. in length, with a mean of 12.8 mm.; and the laminas of the bracts (including the awn) to range from 6 to 10 mm. in length, with a mean of 8.5. Similar measurements of the scales of the variety show the laminas to vary from 8 to 13 mm. in length, with a mean of 11 mm.; and the laminas of the bracts to be of essentially the same length.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—V.

In preparing this list, it seemed to the committee that records of early collections would add to its value and interest, even where the species are common ones. Accordingly all existing specimens collected before 1860 have been mentioned.

There has been very little done in collecting Potamogetons within recent years. Fresh Pond, Cambridge, and Mystic Pond, in Medford and Winchester, have been changed so much that the stations formerly reported there are probably in many cases extinct. The ponds in Wenham should be revisited, however, and there is no reason why other sheets of water favorably located, should not also be productive.

TYPHACEAE.

TYPHA.

T. angustifolia L. Swamps and salt-marshes near the coast. Swampscott (Aug. 18, 1902, comm. Susan Minns). Abundant locally near Boston.

T. latifolia L. Swamps, abundant throughout.

Where the two species grow together there are all kinds of intermediate forms. This is especially noticeable in the big swamps at West Cambridge.

SPARGANIACEAE.

SPARGANIUM.

S. americanum Nutt. Muddy bottoms of streams and ponds in shallow water; fairly well distributed throughout.

S. americanum Nutt., var. **androcladum** (Engelm.) Fernald & Eames. Growing with the type; very abundant. There are two specimens of this variety in the Gray Herb., collected respectively at Beverly in 1856, and in Fresh Pond, Cambridge in 1857 by Asa Gray.

S. angustifolium Michx. Spot Pond [Middlesex Fells] (*Wm. Boott,* Aug. 20, 1865. Specimen in Gray Herb.); Crane Pond, West

Newbury (*J. Robinson*, Aug. 13, 1879); shallow water, common, Ponkapaug Pond, Canton (*J. R. Churchill*, July 26, 1884). This species probably occurs sparingly throughout.

S. diversifolium Graebner. Bogs and muddy shores, Beverly, Sharon, Stoneham, Concord, Wellesley, Natick, Framingham, Hyde Park, Quincy and Randolph.

S. diversifolium Graebner, var. **acaule** (Beeby) Fernald & Eames. See RHODORA, x. 56. 1908. "In running water in muddy-sandy brook. The station (where the plants are rather plenty) is in a warm open meadow. Near State Muster Grounds, South Framingham" (*A. J. Eames*, Sept. 7, 1907); Bridgewater (*E. W. Sinnott*, September, 1908).

S. eurycarpum Engelm. Muddy shores and shallow water, frequent.

S. fluctuans (Morong) Robinson. Ponkapaug Pond, Canton (*J. R. Churchill*, July 26, 1884); in two feet of water, Whitehall Pond, Woodville, Hopkinton (*T. Morong*, Sept. 15, 1887).

S. lucidum Fernald & Eames. Small pond, pasture, close to the road, Medford (*Wm. Boott*, July 29, 1860. One of the type specimens in Gray Herb.); very abundant on muddy shore of Heard Pond, Wayland (*A. J. Eames & C. H. Knowlton*, Sept. 6, 1909).

S. minimum Fries. Spot Pond, Middlesex Fells, in good fruit (*Wm. Boott*, Aug. 31, 1854. Specimen in Gray Herb.); Waushakum Pond, Ashland (*T. Morong*, July 14, 1881; Aug. 7, 1883; Sept. 5, 1887. "Does not fruit here freely, but propagates more by root-stocks.")

NAJADACEAE.

NAJAS.

N. flexilis (Willd.) Rostk. & Schmidt. Shallow water of ponds or slow streams, on sandy or muddy bottoms, common throughout. Collected in Spot Pond, Stoneham, by Wm. Boott, Aug. 31, 1854.

N. flexilis (Willd.) Rostk. & Schmidt, var. **robusta** Morong. "In four feet of water, reaching nearly to the surface, Sudbury River, Concord" (*T. Morong & W. Deane*, Aug. 4, 1886).

N. gracillima (A. Br.) Magnus. Ponds; North Andover, Stoneham, Winchester, Woburn, Mystic Pond. Collected in Winchester by Wm.

Boott, Aug. 23, 1853. "In a springy bog at Sluice Pond, Lynn, 1880" (*E. Faxon*, according to Robinson, Fl. Essex Co. 104. 1880); Ashland (*T. Morong*, according to Dame & Collins, Fl. Middlesex Co. 99. 1888).

POTAMOGETON.

P. americanus C. & S. Running water, occasionally in ponds; Hyde Park, Natick, Topsfield, Winchester, Mystic Pond.

P. amplifolius Tuckerm. Ponds and rivers, frequent in northern half of district, also occurring in Canton.

P. angustifolius Berchtold & Presl. Fresh Pond, Cambridge, (*J. W. Robbins*, Oct. 2, 1851; *Wm. Boott*, Sept. 5, 1853; collected by other botanists down to 1886); Mystic Pond (*Wm. Boott*, Aug. 26, ——); Pleasant Pond, Wenham (various collectors between 1875 and 1884). First two stations probably extinct.

P. bupleuroides Fernald. Fresh and brackish ponds; Cambridge, Lynn, Natick, Wakefield, Wellesley, Wenham, Mystic Pond.

P. CRISPUS L. Pools and ditches among the clay-pits in Cambridge, abundant; also in Spy Pond, Arlington.

P. dimorphus Raf. Ponds and streams, common north and west, but no reports south of Canton.

P. epihydrus Raf. Ponds and streams; many records from all parts of the district.

P. foliosus Raf. Still waters, from scattered stations in eastern half of district.

P. gemmiparus Robbins. Rivers and ponds. Charles River at Dedham and South Natick; Neponset River at Dedham; Fresh Pond, Cambridge; Wenham Pond, Wenham; Mystic Pond (*E. Tuckerman*, according to Dame & Collins, Fl. Middlesex Co. 101. 1888).

P. heterophyllus Schreb. Ponds and streams; numerous stations in northern half, and as far south as Canton.

P. heterophyllus Schreb., forma **graminifolius** (Fries) Morong. Ponds, Stoneham, Cambridge, Wellesley, Natick, Ashland.

P. heterophyllus Schreb., forma **maximus** Morong. Deep running water, Charles River, Natick (*T. Morong*, July 14, 1879 and Sept 5, 1882); Charles River, Dedham (*E. & C. E. Faxon*, Aug. 2, 1880).

P. heterophyllus Schreb., forma **myriophyllus** (Robbins) Morong. Ponds, from six scattered stations in north and west portion.

P. hybridus Michx. Still water, many stations in northern half of district, also occurring in Pembroke. Collected in Roxbury, "near Morlands," Aug. 10–15, 1820; in Peabody by J. L. Russell, August, 1854; and in Mystic Pond by Wm. Boott, Aug. 15, 1858.

P. lateralis Morong. Charles River, Dedham (*Wm. Boott* and *E. & C. E. Faxon*, July 13, 1879; *T. Morong*, July 16, 1880; *E. & C. E. Faxon* and *T. Morong*, Aug. 2, 1880).

P. lucens L. Fresh Pond, Cambridge (several collectors between 1865 and 1886); Wenham Pond, Wenham (*J. W. Robbins*, no date; *Wm. Boott*, Sept. 20, 1867); Pleasant Pond, Wenham (*J. Robinson*, Aug. 13, 1875); Winchester (*L. L. Dame*, according to Dame & Collins, Fl. Middlesex Co., 100. 1888).

P. mysticus Morong. Mystic Pond (*T. Morong*, *E. & C. E. Faxon* and *Wm. Boott*, various collections between 1865 and 1881); Wenham Pond, Wenham (*E. & C. E. Faxon*, Sept. 13, 1880 and Sept. 5, 1882).

P. natans L. Ponds and slow streams; many stations, running as far south as Canton.

× **P. nitens** Weber. Wenham Pond, North Beverly (*E. & C. E. Faxon*, Sept. 13, 1880, and Sept. 5, 1882; *T. Morong & W. Deane*, Sept. 8, 1886).

P. Oakesianus Robbins. Ponds; Beverly, Dedham, Lynn, Natick, Stoneham, Woburn. Mystic Pond, Medford (*Wm. Boott*, according to Dame & Collins, Fl. Middlesex Co., 99. 1888).

P. obtusifolius Mertens & Koch. Ponds and streams; Newbury, Wenham and Natick.

P. praelongus Wulf. Fresh Pond, Cambridge (various collectors between 1865 and 1881); Pleasant Pond, Wenham, 1875 and 1880.

P. pulcher Tuckerm. Ponds, streams and ditches; scattered stations from all parts of district except the northwest and south.

P. pusillus L. Ponds and streams; frequent, but no records from extreme northern and southern portions.

P. pusillus L., var. **polyphyllus** Morong. Foster's Pond, Andover (*A. S. Pease*, Sept. 11, 1903); Fresh Pond, Cambridge (*E. & C. E. Faxon*, July 22 & 23, 1880); shallow muddy pool, South Natick (*T. Morong*, Aug. 29, 1879); Spot Pond, Stoneham, (*Wm. Boott*, Aug. 20, 1865).

P. pusillus L., var. **Sturrockii** Benn. Woburn Brook (*Wm. Boott*, Aug. 25, 1867); Lake Cochichewick, North Andover (*A. S. Pease*, Sept. 24, 1903).

P. pusillus L., var. **tenuissimus** Mertens & Koch. Ponds and streams; eight scattered stations north and west of Boston.

P. Robbinsii Oakes. Deep water of ponds and streams; reported from thirteen stations north and west of Boston.

× **P. spathaeformis** Tuckerm. Mystic Pond, Medford; collected between 1865 and 1881 by Wm. Boott, E. Tuckerman, T. Morong and C. E. Faxon. See Fernald, RHODORA, viii. 224. 1906.

P. strictifolius Benn. Mystic Pond (*Wm. Boott*, Aug. 13, 1865).

P. Vaseyi Robbins. Mystic Pond (*Wm. Boott*, Aug. 6, 1865); Spot Pond, Stoneham (*T. Morong*, July 27, 1876; *L. H. Bailey*, Aug. 1, 1883).

P. zosterifolius Schumacher. Rivers and ponds; Cambridge, Canton, Lynnfield, Natick, Newbury, Wenham.

RUPPIA.

R. maritima L. Shallow brackish and salt water, along the coast.

ZANICHELLIA.

Z. palustris L. Brackish water, Ipswich; Mystic River and Mystic Pond, Medford, between 1865 and 1887; Squantum, Quincy; Revere; Salem.

Z. palustris L., var. **pedunculata** J. Gay. Seashore near Boston (*L. H. Bailey*, Aug. 25, 1883).

ZOSTERA.

Z. marina L. In shallow salt water, generally below low tide; common and abundant along the entire coast.

JUNCAGINACEAE.

SCHEUCHZERIA.

S. palustris L. Bogs and ponds, Acton, Canton, Lynn, Natick, Peabody, rare. Wm. Boott collected this species at Tewksbury on June 23, 1853. Specimen in Gray Herb.

TRIGLOCHIN.

T. maritima L. Salt marshes, common. This species was collected by Wm. Boott on the "Brookline R. R." on May 26, 1854.

C. H. Knowlton
J. A. Cushman
Walter Deane
A. K. Harrison
Committee on Local Flora.

NOTE ON THE MORPHOLOGY OF THE FRUIT OF LONICERA CAERULEA.

Alfred Rehder.

It seems strange that such a widely distributed and well known plant as *Lonicera caerulea* should be so little known in regard to the morphological structure of its fruit, that even in the most recent manuals and floras as well of this country as of Europe the description of the ovaries and fruits is incorrectly given. The fruit is described everywhere as consisting of two connate berries, but a dissection will show at once, even without the aid of a magnifying glass, that this is not the case; the ovaries are entirely separated from each other and remain so until maturity, the bractlets, however, are united into a cupula tightly enveloping the ovaries the whole thus presenting the appearance of perfectly united ovaries without bractlets which in fact are generally described as wanting.

There have been a few botanists who described correctly the ovaries and fruits of this Lonicera, but their statements were overlooked and the old erroneous conception based on superficial observation has remained the current one until today. The first correct description as far as I know was given by Petermann in 1849 (Deutschlands Flora 260, pl. 41, fig. 323, R–T) as follows: Die vier Deckblättchen zu einer die zwei Fruchtknoten eng und gänzlich umschliessenden und endlich zugleich beerenartig werdenden Hülle verwachsen und so nur einen Fruchtknoten darstellend [The four bractlets connate into a cupula enclosing tightly and completely the two ovaries and finally becoming

berrylike, thus simulating only one ovary]; the accompanying figures give a fair illustration of these facts. All of the later writers seem to have overlooked Petermann's statement, until in 1893 Koehne in his Deutsche Dendrologie 545, fig. 96, K) again describes and figures correctly the ovaries apparently without knowing of Petermann's publication; one of his drawings had been published already two years before in Engler & Prantl's Natürliche Pflanzenfamilien (Teil 4, Abteil. 4, p. 167, fig. 57, E), but in the accompanying text Fritsch describes the berries as completely connate. In 1903 I described and figured the fruit in my Synopsis of the genus Lonicera (Rep. Missouri Bot. Gard. XIV. 67, pl. 1, fig. 10–11). Maximowicz in his revision of the Loniceras of Eastern Asia (Bull. Acad. Sci. St. Pétersb. XXXI, 58. 1886) observed the true state of the fruit of *Lonicera caerulea* in a Japanese form, but failed to recognize its identity with *L. caerulea* which he describes in the usual way as having connate ovaries, and published this Japanese form on account of its peculiar bracts as a new species under the name of *L. emphyllocalyx*, the name apparently referring to the large bractlets enclosing the ovaries up to the calyx.

The true character of the fruit is also disclosed by a variety named by Regel *L. caerulea* var. *angustifolia* (Russkaya Dendr. 144. 1873) which shows the tendency at least in the plant cultivated at the Arnold Arboretum, to have the cupula more or less distinctly lobed and sometimes shorter than the ovaries so as to expose partly the latter. We have here again a case where a teratological aberration reveals the true morphological character of parts whose morphological origin seems doubtful.

Lonicera caerulea is the only species of the whole genus containing about 165 species in which the cupula grows with the ovaries into a collective fruit and becomes juicy and colored at maturity. It forms thus a very distinct group by itself. In the allied section *Chlamydocarpi* the cupula and ovaries are in a young state exactly like those of *L. caerulea*, but the cupula does not become fleshy and splits at maturity disclosing the red berries. From this section the *Vesicariae* of Komarov do not differ; they were supposed to have a cupula adnate to the base of the calyx and growing with the ovaries into a rather dry collective fruit. This, however, is not the case, as good and complete material which I had recently the opportunity to examine, has shown. Franchet who first made the erroneous statement in regard to his *L. Ferdinandi* and Komarov who made it in regard to his *L. vesicaria* were deceived as well as myself by the fact that the top of the cupula adheres so

firmly to the base of the calyx and the neck of the ovaries by means of a dense matted villous tomentum with which the cupula and the top of the ovary is clothed, that even in thin sections they can only be separated by some force. Furthermore fully ripe fruits were not known at the time of the description of these species and the half-ripe berries had the appearance of a perfectly closed rather dry fruit, while material recently received showed that in both species the cupula splits at maturity and discloses the red berries.

Among the American Loniceras there is no other species which approaches *L. coerulea* in the shape and behavior of the bractlets; the nearest is *L. involucrata*, but in this species the bractlets though very large and growing with the fruits do not form a real cupula, they are only slightly connate and subtend, but do not enclose the berries. Among the Old World species, however, all intermediate states can be found from species with four small completely separate bractlets to species with a perfect cupula tightly enclosing the ovaries. There is even a species, *L. Griffithii* Hook. f. & Thoms., belonging to the subgenus *Periclymenum* in which all the bractlets of a whorl of six flowers are connate into one common cupula.

A few words may be added here on the morphology of the inflorescence in the genus *Lonicera*. The inflorescence is a simple three-flowered cyme with the central flower suppressed in the subgenus *Chamaecerasus*, while in the subgenus *Periclymenum* (*Caprifolium*) all three flowers are developed and the flowers of the two opposite sessile cymes form here six-flowered whorls. Each flower has two prophylls. The prophylls of the central flower bearing in their axils the two lateral flowers are called bracts; they are always present, though in a few cases as in *L. oblongifolia* and *L. conjugialis* very minute and caducous; in shape they vary from subulate to foliaceous. The prophylls of the lateral flowers of which there are four in each cyme, two for each flower, are designated as bractlets; they are generally roundish in outline and usually partly connate in various ways and different degrees, less often perfectly separate and sometimes entirely wanting or only recognizable as minute tubercles at the base of the ovaries. In most species of the subgenus *Periclymenum* and in a few other species the leaves subtending the cymes become bractlike, but must not be confused with the real bracts and bractlets.

Arnold Arboretum.

A KEY TO THE SPECIES AND PRINCIPAL VARIETIES OF CLADONIA OCCURRING IN NEW ENGLAND.

Lincoln Ware Riddle.

One of the most urgent needs in the study of lichens at the present time is a set of keys to the larger genera. So far as I am aware no key to the New England species of *Cladonia* has ever been published. It is to contribute toward filling this need that the following key is here offered. It is based on the study of an extensive series of specimens, and has been tested by several students, both inexperienced and experienced. Yet, in a genus where the species are as variable as in Cladonia and where such puzzling transitional forms occur, it is not to be expected that any key can be constructed that will serve for the determination of all specimens. It is hoped, however, that with material which is fairly typical, satisfactory results may be obtained. For the authors and synonymy of the species given, reference may be made to the check-list to be found on pages 215 and 216.

Sect. I. Primary thallus persistent and crustaceous. Podetia short (mostly under 1 cm.), club-shaped, simple or branched, apothecia pale brown, poorly developed. ..... *C. papillaria*

Sect. II. Primary thallus squamulose when present, often disappearing.

Sub-Sect. 1. Squamules when present medium-sized to small, whitish on under side. (For Sub-Sect. 2, see end of key).

Series 1. Apothecia red. (Rarely the species of this series may have pale yellowish-brown apothecia, a condition known as var. *ochrocarpia*.)

A. Podetia cylindrical, without cups.

B. Green to yellow, smooth to warty, never sorediate.

C. Simple below, sparingly branched above.

D. Podetia reduced, squamules of thallus sorediate ..... *C. cristatella* v. *paludicola*

DD. Podetia well-developed, thallus not sorediate.

E. Podetia with few squamules or none..... *C. cristatella*

EE. Podetia densely squamulose..... *C. cristatella* v. *vestita*

CC. Podetia branched throughout..... *C. cristatella* v. *ramosa*

BB. Grayish, powdery-sorediate.

C. Thallus scanty, podetia rarely squamulose.

D. Podetia stout, sparingly branched, KOH + ... *C. macilenta*

DD. Podetia slender, simple, KOH —..... *C. bacillaris*

CC. Thallus well-developed, podetia short, squamulose, decorticate between the squamules..... *C. didyma*

AA. Podetia cup-bearing.

B. Podetia medium-sized (mostly 2 cm. or less).

C. Podetia white-powdery-sorediate, cup with incurved margins, commonly proliferating..... *C. digitata*

CC. Podetia warty or granulate-sorediate, cups dilated, rarely proliferating..... *C. coccifera*

BB. Podetia elongated (mostly 4 cm. or over), yellowish.
C. Podetia sulphur-powdery, never squamulose.....*C. deformis*
CC. Podetia smooth and densely squamulose.....*C. bellidiflora*
Series 2. Apothecia brown.
A. Podetia cylindrical, without cups.
B. Podetia simple or nearly so, primary thallus usually persistent.
C. Podetia absent or thickly squamulose.
D. Podetia absent or nearly so, squamules coarse
C. caespiticia
DD. Podetia evidently present, squamules fine, often sorediate.
E. Podetia short (1 cm. or less).....*C. delicata*
EE. Podetia taller (2 cm. or more).....*C. decorticata*
CC. Podetia present and with few squamules or none.
D. Corticate, without soredia or granules.
E. Cortex continuous or nearly so.
F. Podetia short (mostly less than 2 cm.).
G. Squamules fine, podetia slender in proportion to the apothecia.....*C. mitrula*
GG. Squamules coarse, podetia stouter.
H. Typically simple, KOH + (red)...*C. subcariosa*
HH. Branched above, KOH —...*C. cariosa* v. *corticata*
FF. Podetia elongated (over 3 cm.)
G. Slender, little inflated.....*C. gracilis* v. *chordalis*
GG. Stout, much inflated.....*C. gracilis* v. *elongata*
EE. Cortex fissured, irregular and uneven.....*C. cariosa*
DD. More or less decorticate, sorediate, or granulate.
E. Scurfy-granulate.....*C. pityrea*
EE. Powdery-sorediate.
F. Podetia perforate, gray.....*C. glauca*
FF. Podetia not perforate.
G. Podetia whitish throughout.
H. Simple, 2 cm. high or less..*C. fimbriata* v. *coniocrea*
HH. Sparingly branched, 3 cm. high or more
C. fimbriata v. *subulata*
GG. Podetia brown below.....*C. cornuta*
BB. Podetia repeatedly branched and forming more or less intricate masses, thallus mostly disappearing.
C. Podetia corticate, smooth, squamules when present coarse.
D. Yellowish-green, tips fastigiate, blunt.....*C. uncialis*
DD. Grayish or brownish-green, tips dichotomous, acute.
E. Cortex continuous, without soredia.
F. With few squamules or none.
G. Podetia more or less erect, in loose masses.
H. Podetia wholly gray.....*C. furcata*
HH. Brown, especially above...*C. furcata* v. *palamaea*
GG. Podetia intricately intertangled in dense masses
C. rangiformis
FF. More or less covered with coarse squamules
C. furcata v. *pinnata*
EE. Cortex broken in places, and sorediate especially above
C. furcata v. *scabriuscula*
CC. Podetia decorticate, squamules when present fine.
D. Podetia without squamules.
E. Ultimate branches recurved, tips blunt...*C. rangiferina*
EE. Ultimate branches more erect, tips acute.
F. Loosely branched, in irregular masses....*C. sylvatica*
FF. Intricately branched, in dense rounded tufts
C. alpestris

DD. Podetia covered with fine squamules
C. squamosa v. *muricella*
AA. Podetia cup-bearing, often proliferating (i. e. branching from the margins of the cup).
B. Cups perforate.
C. Without soredia.
D. With scattered coarse squamules or none.
E. Podetia smooth.
F. Slightly inflated, cups narrow.....*C. crispata*
FF. Much inflated, cups spreading, often becoming leafy
C. turgida.
EE. Podetia pitted.....*C. reticulata*
DD. Covered with fine squamules.....*C. squamosa*
CC. Gray powdery-sorediate.....*C. cenotea*
BB. Podetia never perforate.
C. Corticate and smooth.
D. Gray or brownish green.
E. Proliferations from margins of cups.
F. Cups regular, squamules few or none.....*C. gracilis*
(*C. gracilis* v. *chordalis & elongata* may also be sought here)
FF. Cups irregular, podetia squamulose
C. gracilis v. *dilatata*
EE. Proliferations from center of cup.....*C. verticillata*
DD. Yellowish-green.....*C. amaurocrea*
CC. Podetia warty or decorticate.
D. Powdery-sorediate.
E. Cups regular and simple.....*C. fimbriata*
EE. Cups irregular and proliferous....*C. fimbriata* v. *radiata*
DD. Not powdery-sorediate.
E. Areolate-warty, cups ample.
F. Simple or nearly so.....*C. pyxidata*
FF. Luxuriantly proliferous.....*C. degenerans*
EE. Scurfy-granulate, cups reduced.....*C. pityrea*
Sub-Sect. 2. Squamules always present, strikingly large, creamy-yellow on under side.....*C. foliacea* v. *alcicornis*

Wellesley College.

PRELIMINARY LISTS OF NEW ENGLAND PLANTS,—XXIII.[1] CLADONIACEAE.

LINCOLN WARE RIDDLE.

[The sign + indicates that an herbarium specimen has been seen; the sign − that a reliable printed record has been found.]

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Baeomyces byssoides (L.) Schaer.	+	+	+	+	−	
" ericetorum (L.) Wainio	+	+	+	−		
" placophyllus Ach.		+				
" roseus Pers.	+	+	+	+	+	+
Cladonia alpestris (L.) Rabenh.	+	+	+	+	−	+
" amaurocrea (Flke.) Schaer.	+	+	+			
" bacillaris Nyl.	+	+	+	+		+
" caespiticia (Pers.) Flke.	+	+		+	+	
" cariosa (Ach.) Spreng.	+	+	+	+	−	+
" " var. corticata Wainio	−			+		
" carneola Fr.		+				
" cenotea (Ach.) Schaer.	+	+	+	+	−	
" coccifera (L.) Willd.	+	+	+	+	−	+
" " var. ochrocarpia Flke.		+		+		
" " var. pleurota (Flke.) Schaer.		+		−		
" cornuta (L.) Schaer.		+	+	−	−	
" crispata (Ach.) Flot.	+	+	+	+	−	+
" cristatella Tuck.	+	+	+	+	+	+
" " var. ochrocarpia Tuck.		+		+	+	
" " var. paludicola Tuck.				+		
" " var. ramosa Tuck.		+		+		
" " var. vestita Tuck.	+	+	+	+		
" decorticata (Flke.) Spreng.	−	+				
" deformis Hoffm.	+	+	+	+		
" degenerans (Flke.) Spreng.		+	+	−	+	
" delicata (Ehrh.) Flke.	+	+	+	+		
" digitata Schaer.	+	+		+		
" fimbriata (L.) Fr.	+	+	+	+	+	+
" " var. coniocrea (Flke.) Wain.	+	+	+	+	+	+
" " var. nemoxyne (Ach.) Coem.		+				
" " var. radiata (Schreb.) Coem.		+		+		
" " var. subulata (L.) Wainio		+				

[1] Printed in RHODORA as supplementary matter.

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Cladonia foliacea var. alcicornis (Lightf.) Schaer	−	+		+	−	−
" furcata (Huds.) Schrad.	+	+	+	+	+	+
" " var. palamaea (Ach.) Nyl.		+		+	+	+
" " var. pinnata (Flke.) Wainio	+	+	+	+		+
" " var. scabriuscula (Del.) Coem.	+	+		+	+	
" glauca Flke.				+	−	
" gracilis (L.) Willd.	+	+	+	−	−	−
" " var. chordalis (Flke.) Schaer.		+	+		−	
" " var. dilacerata Flke.	+	+	+			
" " var. elongata (Jacq.) Flke.	+	+		+		
" macilenta Hoffm.	+	+	+	+	+	
" mitrula Tuck.				+		+
" papillaria (Ehrh.) Hoffm.	+	+	+	+	+	+
" pityrea (Flke.) Fr.	+	+	+	+		
" pyxidata (L.) Fr.	+	+	+	+	+	+
" " var. chlorophaea (Spreng.) Flke.	+	+				
" rangiferina (L.) Web.	+	+	+	+	+	+
" rangiformis Hoffm.		+				
" reticulata (Russell) Wainio	+	+		+	+	+
" squmosa (Scop.) Hoffam.	+	+	+	+		
" " var. multibrachiata (Flke.) Wainio.		+		−		
" " var. muricella (Del.) Wainio	+	+		−		
" " var. phyllocoma Rabenh.	+	+				
" subcariosa Nyl.	−	+		+		−
" sylvatica Hoffm.	+	+	+	+	+	+
" turgida (Ehrh.) Hoffm.	+	+	+	+		
" uncialis (L.) Web.	+	+	+	+	+	+
" verticillata Hoffm.	−	+	+	+	+	+
Pilophorus Cereolus var. Fibula Tuck.	−	+				
Stereocaulon alpinum Laur.	+	+				
" condensatum Hoffm.	−			+		+
" coralloides Fr.	+	+	+	−		
" denudatum Flke.		+	+	−		
" nanodes Tuck.		+				
" paschale (L.) Ach.	+	+	+	+		+
" pileatum Ach.	+	+	+	+		
" tomentosum Fr.	+	+	+	+		+
Thamnolia vermicularis (Sw.) Schaer.	+	+	+			

Notes upon the above List

The names adopted in the genus *Cladonia* are based on Wainio's "Monographia Cladoniarum Universalis." In cases where the nomenclature of Tuckerman's "Synopsis of North American Lichens" differs from that of Wainio, the Tuckerman name is given in parenthesis, in these notes, following the Wainio name. On one point only does the usage here followed depart from that of Wainio. In his Monograph, he has distributed all the forms of polymorphic species under varietal names, making, therefore, a compound conception of the species. This is a practice not followed in other groups of plants and apparently unnecessary. In this list the specific name is understood to stand for the typical form of the species, and is equivalent to the first variety given under each species by Wainio. This is liable to lead to confusion only in the following species: *Cladonia fimbriata, furcata,* and *gracilis.* For the synonymy, reference may be made to the notes on these species given below.

Baeomyces ericetorum (L.) Wainio. (*B. aeruginosus* (Scop.) DC.) There is considerable doubt as to the true relationships of this species, but it has seemed best in this list to retain it in its traditional position, using, however, the earlier name. (Compare Wainio: Notulae de synonymia lichenum, in Medd. Soc. pro Fauna et Flora fennica, vol. **14**, 1886.)

Cladonia alpestris (L.) Rabenh. (*Cl. rangiferina* var. *alpestris* (L.) Schaer.)

Cladonia bacillaris Nyl. (*Cl. macilenta* (Ehrh.) Hoffm. in part.)

Cladonia cariosa var. *corticata* Wainio. (*Cl. symphycarpa,* in part, of American authors, not Fries.) Compare Fink in Bryologist **9**: 23 (1906).

Cladonia coccifera (L.) Willd. (*Cl. cornucopioides* (L.) Fr.)

Cladonia crispata (Ach.) Flot. (*Cl. furcata* var. *crispata* Flke.)

Cladonia fimbriata (L.) Fr. Under the specific name is included material called "var. *simplex*" by Wainio, "var. *tubaeformis* Fr." by Tuckerman, in part. Tuckerman's "var. *tubaeformis*" also included what is here called "var. *coniocrea* (Flke.) Wain."; and his "var. *radiata* Fr." included the remaining three varieties of this list.

Cladonia foliacea var. *alcicornis* (Lightf.) Schaer. (*Cl. alcicornis* (Lightf.) Flke.) The Maine record is based on Rand & Redfield's "Flora of Mt. Desert Island." Through the courtesy of Mr. E. L.

Rand, I have had the opportunity of examining the lichens preserved in his herbarium. The specimen upon which this record was apparently based is very doubtful, and much better referable to *Cl. cariosa* var. *corticata* Wainio. I have left the record in the list, however, as Mr. Rand states that some of the records of lichens were based on specimens in other herbaria than his own.

Cladonia furcata (Huds.) Schrad. Under the specific name is included the "var. *racemosa* (Hoffm.) Flke." of Wainio's Monograph, and also of Tuckerman, in part. The "var. *racemosa*" of the latter also included material placed by Wainio under "var. *pinnata* (Flke.)." "Var. *palamaea* (Ach.) Nyl." is equivalent to "var. *subulata* Flke." but "var. *scabriuscula* (Del.) Coem." was not recognized by Tuckerman, and appears not to be represented in his herbarium.

Cladonia glauca Flke. (*Cl. cenotea* var. *furcellata* Fr.)

Cladonia gracilis (L.) Willd. The specific name is understood to stand for the "var. *dilatata*" of Wainio, and the "var. *hybrida*" of Tuckerman, in part, the latter also including material here referred to "var. *dilacerata* Flk. "Var. *chordalis* (Flke.) Schaer." is the "var. *elongata* f. *chordalis* Fr." of Tuckerman, and "var. *elongata* (Jacq.) Flke." is the "var. *elongata* f. *macroceras* Fr."

Cladonia pityrea (Flke.) Fr. (*Cl. fimbriata* var. *adspersa* Tuck. in part.)

Cladonia rangiformis Hoffm. (*Cl. furcata* var. *pungens* Fr.)

Cladonia reticulata (Russell) Wainio. (*Cl. Boryi* Tuck.)

Cladonia squamosa (Scop.) Hoffm. The vars. *multibrachiata* and *phyllocoma* of this list have been little studied by American workers, and the records are, therefore, based on material determined by L. Scriba of Frankfort, Germany. "Var. *muricella* (Del.) Wainio" is equivalent to "f. *attenuata* Fr."

Cladonia subcariosa Nyl. (*Cl. gracilis* var. *verticillata* f. *symphycarpia* Tuck., *Cl. symphycarpa*, in part, of American authors, not Fries.) See note below under *Cl. alpicola* var. *Karelica* Wainio.

Cladonia sylvatica (L.) Hoffm. (*Cl. rangiferina* var. *sylvatica* (L.) Schaer.)

Cladonia verticillata Hoffm. (*Cl. gracilis* var. *verticillata* Fr.)

The following species recorded from New England have been omitted from the list for the reasons stated below.

Cladonia bellidiflora (Ach.) Schaer. Recorded as collected in Wells, Maine, by J. Blake in Harvey's "Contributions to the Lichens of

Maine" (Bull. Torrey Bot. Club **21**:389). Through the courtesy of Prof. M. A. Chrysler, I have had an opportunity of examining the specimens upon which this record was based. The specimens are very doubtfully *Cl. bellidiflora*, having a much stronger resemblance to squamulose forms of *Cl. cristatella* Tuck. Similar specimens, collected in the White Mts. by Tuckerman are in the latter's herbarium, marked doubtful.

Cladonia didyma (Flke.) Wainio. (*Cl. pulchella* Schwein.) Recorded in Rand & Redfield's "Flora of Mt. Desert Island, Maine"; but no specimen is to be found in Mr. Rand's herbarium, and as the species is distinctly southern in its distribution and is not otherwise known from New England, the record was probably based on an erroneous determination.

Cladonia flabelliformis (Flke.) Wainio. Recorded by Willey in his "List of the Lichens of New Bedford, Mass.," but not generally recognized by American students as distinct from *Cl. macilenta*.

Cladonia lepidota Fr. Recorded by Willey (*l. c.*). This species is considered by Wainio to be synonymous with *Cl. cristatella* var. *ochrocarpia* Tuck. and the specimens are, therefore, listed under that name.

Cladonia leptophylla Nyl. Recorded by Willey (*l. c.*), but included under *Cl. mitrula* Tuck. by American students.

Cladonia pyxidata var. *pocillum* Ach. Recorded by Willey (*l. c.*). This is an arctic variety not otherwise known from New England, and this record must, therefore, be considered doubtful.

Cladonia alpicola var. *Karelica* Wainio. This is stated by Wainio to be synonymous with the true *Cl. symphycarpa* of Fries. It is recorded from New England by G. K. Merrill in Bryologist **12**:46 (1909), but no specimens examined appear to belong here, and it is, therefore, omitted until better known. Mr. Merrill has also, within the last year, segregated two new species, *Cladonia multiformis* (in Bryol. **12**:1) and *Cl. polycarpia* (in Bryol. **12**:46). It has seemed best, however, not to include these in the list until their status can be determined by further study.

Wellesley College.

Scirpus Smithii in Massachusetts.— When the Preliminary List of New England Cyperaceae [1] was issued, *Scirpus Smithii* Gray was unknown from two of the New England States, New Hampshire and Massachusetts. Very quickly thereafter Mr. F. W. Batchelder [2] recorded it from the shore of Lake Massabesic in southern New Hampshire, and it is now gratifying to report it from eastern Massachusetts. On September 18 last, the writer, attracted by the report of an extensive station for *Sparganium lucidum* Fernald & Eames, *Cyperus aristatus* Rottb., *Hemicarpha micrantha* (Vahl) Pax, *Xanthium canadense* Mill., and other species which are among the most local of Middlesex County, joined Mr. A. J. Eames on a trip to Heard's Pond, Wayland. These plants were soon found in abundance, as well as several which were before unknown from that station. Among them is *Scirpus Smithii* which grew in a shaded mucky shore where it was hidden by the taller grasses and sedges. It is interesting that *S. Smithii* should be the only one of the *Scirpus debilis* group at Heard's Pond, for in eastern Massachusetts the members of this group show a remarkable tendency to restrict their development to very isolated stations. Thus *S. Hallii* is known in New England only from the shores of Winter Pond; *S. debilis*, var. *Williamsii* has as yet a single known station (in the world), the margin of Massapoag Lake in Sharon, where it abounds to the exclusion of other members of the group; and now *S. Smithii* is found at its first Massachusetts station, Heard's Pond, where no other members of the group are known. *S. debilis* (typical) is the only plant of the group as yet known from more than a single pond-shore, but even that species is so local as to be unknown to most of our New England botanists.— M. L. Fernald, Gray Herbarium.

[1] Rhodora, x. 135–144 (1908).
[2] Rhodora, x. 205 (1908).

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